

PATENT ABSTRACTS OF JAPAN

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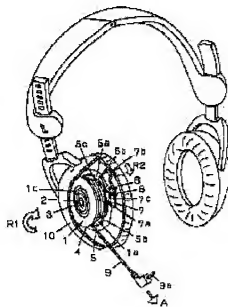
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(54) HEADPHONE WITH CORD WINDING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent a click sound from emitting at an ear at the time of drawing a cord in a headphone equipped with an input cord winding device.

SOLUTION: When an input cord 9 is held by a hand and is drawn in a direction of an arrow A, a reel 1 rotates in a direction opposite to an arrow R1 while the reel 1 resists a recovery force of a coil spring 3 and a pawl 7a of a stopper 7 pressed on a flange 5 outer periphery by an energizing spring 8 is jumping a notch 5a for lock. When the pawl 7a of the stopper 7 falls into a slope side 5c by an energizing force of the energizing spring 8, a buffer material 7c receives the flange 5 which clashes with shock so that a click sound is prevented from being emitted.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the headphone to which the input code take-up motion which rolls round input code was attached.

[0002]

[Description of the Prior Art]It follows on the increase in the portable audio apparatus heard by headphone not using a loudspeaker in recent years, as headphone -- an inner -- disagreeable -- what is inserted and used into the ear pinna called type or an inside phone, and the thing made to contact a head from on the ear pinna called a large-scale truncated form or an earflap form are used. The input code for inputting an audio signal from audio equipment is required for all, and storage of input code had become a technical problem in use of headphone. Therefore, the case where input code is accommodated is used or what formed the code take-up motion in the headphone and audio equipment side is used.

[0003]The perspective view of the important section is shown in drawing 8 at the sectional view of the headphone with a code take-up motion of the conventional truncated form, and drawing 9, and the appearance explanatory view at the time of the use is shown in drawing 10. In drawing 8, the anterior part housing 10c of the headphone housing 10 is countered at the external auditory meatus of human being's ear, 10 d of anterior part puncturing is provided, and the loudspeaker unit 21 is attached towards 10 d of this anterior part puncturing. While the ear pad 22 which covered the surface of sponge with the elastic synthetic resin leather etc. is attached on the outskirts of front of the anterior part housing 10d and contacting the temporal region softly, the ear-pinna circumference is covered and a sound leak and invasion of a surrounding noise are prevented. The take-up motion board 23 is attached to the point of the support 10e prolonged from the anterior part housing 10c in the direction which keeps away from back, i.e., an ear, to one, the pivot 2 is stood erect in this take-up motion board 23, and

the reel 1 is attached in this pivot 2, enabling free rotation. The code rolling-up part 1a which rolls round the input code 9 spirally, this code rolling-up part 1a and the divided code sag part 1b, and the coil spring stowage 1c divided into the opposite hand of the code sag part in the central part of the reel 1 are established in the reel 1. As for the input code 9, an end is electrically connected to the terminal area 21a of the loudspeaker unit 21 with soldering etc., It goes into the code sag part 1b from the hole 23a provided in the take-up motion board 23, and is loosely wound in the shape of a whorl several times here, and penetrated reel 1 inside further, and it was fixed to the reel 1 in this portion, and also goes into the code rolling-up part 1a, and is wound around this. The housing 10 covers these from the rear of a take-up motion, the code cash-drawer hole 10a which pulls out the input code 9 caudad is formed, and the plug 9a linked to audio equipment is attached at the tip of the input code 9 pulled out from here.

[0004]In the headphone 51 for the ears of another side to which the headphone 50 for one ear to which the code take-up motion was attached are constituted, and a code take-up motion is not attached, like drawing 10 Thus, the head strap 52, Although not illustrated, it is connected by the input code electrically connected to the headphone 51 for the ears of another side, and the headphone of a truncated form are constituted.

[0005]In drawing 9, the reel 1 is attached in the pivot 2 in the center, enabling free rotation. And one end adheres to the pivot 2 and the other end is energized in the arrow R1 direction of clockwise by the coil spring 3 which adhered to the coil spring stowage 1c inner surface of the reel 1. The infeed 5a for a lock carries out the equal division by integer of the perimeter to one 5 of the flanges 4 and 5 of the both sides of the reel 1, and is provided in it, It is energized by the clockwise arrow R 2-way with the energization spring 8 which applied one end to the stopper 7 and applied the other end to the substrate or the housing so that the stopper's 7 nail 7a supported pivotally by the axis 6 enabling free rotation might carry out press insertion at the infeed 5a of the flange 5, and what is called a ratchet mechanism is made. The release button 7b is formed in the other end of the stopper's 7 nail 7a.

[0006]It is constituted as mentioned above and the operation is explained below. When elongating in order to connect with the audio equipment which does not illustrate the input code 9, it pulls in the direction of arrow A with the input code 9. Then, the reel 1 is rotated to the arrow R1 and an opposite direction, i.e., a counterclockwise rotation, while resisting the stability of the coil spring 3, and while the stopper's 7 nail 7a currently pressed by flange 5 periphery with the energization spring 8 jumps over the gentle slope side 5b of the infeed 5a for a lock, If hauling of the code 9 is stopped in arbitrary parts, according to the stability of the coil spring 3, the reel 1 is packed, when it rotates in the arrow R1 direction and the stopper 7 rotates to an arrow R 2-way with the energization spring 8, and 7a will eat into the steep incline side 5c of the infeed 5a for a lock, and it will stop.

[0007]If the stopper's 7 release button 7b is pressed when it is going to store the input code 9,

the nail 7a is wide opened from the steep incline side 5c of the infeed 5a of the flange 5, according to the stability of the coil spring 3, it will rotate in the arrow R1 direction and the reel 1 will roll round the input code 9.

[0008]

[Problem(s) to be Solved by the Invention] Since the stopper's 7 nail 7a is pressed by flange 5 periphery of the reel 1 with the energization spring 8 when elongating the input code 9 in the above-mentioned process, When jumping over the infeed 5a for a lock, it falls in the steep incline side 5c, the flange 5 contacts the stopper 7, and a click is generated. However, since the code take-up motion is formed in the inside of the headphone housing 10, close will come to an ear directly, and this click will be considerable volume, and will turn into an unpleasant noise.

[0009] In order that it may rotate with sufficient vigor in the arrow R1 direction and the reel 1 may roll round the input code 9 quickly according to the stability of the coil spring 3 if the release button 7b is pressed when storing the input code 9, The vigor ***** plug 9a was equivalent to a user's face, and a possibility that might go into eyes or it might be injured also had it.

[0010] It is what is going to provide the headphone with a code take-up motion which mechanical noise does not worry even if this invention solves the technical problem of these former and it elongates input code during headphone wearing, It is going to provide the headphone with a code take-up motion which prevent the danger at the time of input code storage by furthermore making storage of input code impossible during wearing.

[0011]

[Means for Solving the Problem] To achieve the above objects, headphone with a code take-up motion of this invention, A rolling-up means energized so that it might provide in a housing and said input code might be rolled round in said housing with input code in claim 1, A ratchet means which permits a cash drawer from said housing of said input code while said rolling-up means is interlocked with and preventing rolling up of said input code of said rolling-up means, It is the composition provided with a release means of which inhibition of input code rolling up by said rolling-up means of said ratchet means is canceled, and a buffering means which reduces a sound generated by the intermittent contact between members of said ratchet means at the time of a drawer from said housing of said input code.

[0012] Operation that a click generated when pulling out input code and both the members of a ratchet means contact intermittently by this composition can be reduced by a buffering means is obtained.

[0013] A rolling-up means energized so that it might provide in a housing and said input code might be rolled round in said housing with input code in claim 2, A ratchet means which permits a cash drawer from a housing of said input code while said rolling-up means is

interlocked with and preventing rolling up of said input code of said rolling-up means, It is the composition provided with a release means of which inhibition of input code rolling up by said rolling-up means of said ratchet means is canceled, and a ratchet release means which makes said ratchet means non-actuation at the time of a drawer from said housing of said input code.

[0014]When this composition draws out input code, a ratchet means will be made into non-actuation by a ratchet release means, and it will act so that a click by both the members of a ratchet means contacting intermittently may not be generated.

[0015]Further in [are the composition of having added a checking means which makes a release means non-actuation in the state with which it can equip for listening to composition of claim 1 or 2 in claim 3, and] claim 4, Input code and a rolling-up means energized so that it might provide in a housing and said input code might be rolled round in said housing, It is the composition provided with a ratchet means which permits a cash drawer from said housing of said input code while said rolling-up means is interlocked with and preventing rolling up of said input code of said rolling-up means, and a checking means which makes said release means non-actuation in the state with which it can equip for listening.

[0016]When headphone have shape with which a head can be equipped by these composition, it prevents from rolling round input code in a housing by a checking means, and it acts so that vigor ***** input code or a plug may not do harm to a human body by rolling up under wearing.

[0017]In claim 5, in said claims 3 and 4, a final controlling element which constitutes a release means is arranged at a position covered with an arm part of a head strap in a state with which it can equip for listening, and it constitutes so that operation may become impossible in the state concerned.

[0018]In the state where it equipped by this composition for listening, by an arm part of a head strap, the final controlling element of a release means itself cannot be operated, and it becomes, without it seeming that it is going to operate it by mistake.

[0019]

[Embodiment of the Invention]Based on a drawing, one embodiment of the headphone with a code take-up motion of this invention is described below.

(Embodiment 1) Similarly the perspective view, drawing 2, and drawing 3 which drawing 1 fractures the important section of the headphone with a code take-up motion of the embodiment of the invention 1, and are shown are an important section sectional view for the explanation of operation.

[0020]In drawing 1 - drawing 3, the reel 1 is attached in the pivot 2 in the center, enabling free rotation. And one end adheres to the pivot 2, and the other end is energized in the arrow R1 direction by the coil spring 3 which adhered to the coil spring stowage 1c inner surface of the reel 1, rolls round, and constitutes the means. The infeced 5a for a lock carries out the equal

division by integer of the perimeter to one 5 of the flanges 4 and 5 of the both sides of the reel 1, and are provided in it, [two or more] The stopper 7 concerned is energized by the arrow R 2-way with the energization spring 8 which applied one end to the stopper 7 and applied the other end to the substrate or the housing so that the stopper's 7 nail 7a supported pivotally by the axis 6 enabling free rotation might carry out press insertion at the infeed 5a of the flange 5. It puts with the infeed 5a, the relation of 7a is packed in the direction R3 which pulls out the input code 9, 7a is engaged the gentle slope side 5b, the nail 7a cuts deeply easily, it separates from 5a, and the nail 7a constitutes the ratchet means locked by being engaged the steep incline side 5c in the direction which rolls round the input code 9. The release button 7b used as the final controlling element of release is formed in the other end of the stopper's 7 nail 7a.

[0021]The plug 9a which one end is wound around the code rolling-up part 1a of the back reel 1 which was connected to the input terminal 21a of the loudspeaker unit 21, and was once fixed to the reel 1, and the input code 9 is pulled out like conventional drawing 8, and connects with audio equipment at the other end is attached, These portions are stored by housing 10 inside, the input code 9 is pulled out from the code outlet 10a of the housing 10, and the stopper's 7 release button 7b is exposed from the puncturing 10b like drawing 2. The composition others were indicated to be to drawing 8 is altogether applied similarly in this embodiment.

[0022]The rubber of elasticity [point / from drawing 9 in the conventional headphone with a code take-up motion / different / root / of the stopper's 7 nail 7a], Although the shock absorbing material 7c using raw materials, such as a synthetic resin, is adhered, and the stopper's 7 nail 7a is pressed in the flange 5 direction and falls in the infeed 5a with the energization spring 8, before the stopper 7 and the flange 5 contact, it is the point of having the buffering means it was made for the shock absorbing material 7c to contact.

[0023]About the headphone constituted as mentioned above, the operation is explained below. When elongating in order to connect with the audio equipment which does not illustrate the input code 9, it pulls in the direction of arrow A with the input code 9. Then, the reel 1 is rotated in the arrow R3 direction, while resisting the stability of the coil spring 3, and while the stopper's 7 nail 7a currently pressed by flange 5 periphery with the energization spring 8 jumps over the infeed 5a for Locke like drawing 2 (a), If hauling of the code 9 is stopped in arbitrary parts, according to the stability of the coil spring 3, the reel 1 is packed, when it rotates in the arrow R1 direction and the stopper 7 rotates to an arrow R 2-way with the energization spring 8, and 7a will eat into the steep incline side 5c of the infeed 5a for Locke, and it will stop.

[0024]When the stopper's 7 nail 7a jumps over the infeed 5a for Locke at this time, It puts, when the nail 7a falls in the steep incline side 5c according to the energizing force of the energization spring 8, and the shock absorbing material 7c catches and buffers that either 7a

or the stopper 7 collides with the flange 5 shockingly like drawing 2 (b). When the nail 7a jumps over the infeed 5a of the flange 5 conventionally by this, the click which the flange 5 contacted the stopper 7 intermittently and had been generated can be reduced.

[0025]If operation presses the stopper's 7 release button 7b when storing the input code 9, the nail 7a is wide opened from the steep incline side 5c of the infeed 5a of the flange 5, according to the stability of the coil spring 3, it will rotate in the arrow R1 direction and the reel 1 will roll round the input code 9.

[0026]In this embodiment, thus, the rubber of elasticity [root / of the stopper's 7 nail 7a], Adhere and the shock absorbing material 7c using raw materials, such as a synthetic resin, is made into a buffering means, Although the stopper's 7 nail 7a is pressed in the flange 5 direction and falls in the infeed 5a with the energization spring 8 at the time of extension of the input code 9, before the stopper 7 and the flange 5 contact, generating of a click can be reduced when the shock absorbing material 7c contacts.

[0027]The shape of the shock absorbing material 7c is good also as composition that stopper 7 the very thing does not contact the flange 5, as shown in the shock absorbing material 7d of drawing 3 (a), or the shock absorbing material 7e of drawing 3 (b). What is necessary is for a backlash when a cash drawer is stopped to decrease so that there are many infeeds 5a of a ratchet mechanism, but to take the neighborhood into consideration and just to determine, since vibration of the stopper 7 at the time of a drawer increases and the effect of shock absorbing material is also influenced. Although the flange 5 of the reel 1 was used for the ratchet gear in this embodiment, it may provide in the outside surface of the flange 5, or the reel 1 may be a separate member, and a ratchet gear should just be interlocked with the reel 1.

[0028](Embodiment 2) Drawing 4 is an important section sectional view of the headphone with a code take-up motion of the embodiment of the invention 2. Since the composition of the reel 11 or pivot 12 grade is similar and the rolling-up direction of the reel 11 has only changed to the thing of Embodiment 1 of drawing 2, duplicate graphic displays and explanation are omitted. In drawing 4 (a), the reel 11 shall be energized in the arrow R4 direction of a regular figure within the housing 20 by the coil spring which omitted the graphic display. There is a flange in the reel 11 like the thing of drawing 2 at both sides, and since it is a sectional view, only one's of these 15 is shown. The infeed 15a for a lock carries out the equal division by integer of the perimeter to the flange 15, and more than one are provided, It is energized in the arrow R5 direction with the energization spring 18 which applied one end to the stopper 17 and applied the other end to the housing 20 so that the stopper's 17 nail 17a supported pivotally by the axis 16 enabling free rotation might carry out press insertion at the infeed 15a of the flange 15. It has exposed from the hole 20b which the release button 17b was formed in the opposite hand other end about the axis 16 of the stopper's 17 nail 17a, and was provided in the housing

20.

[0029]The roller 17d is made to fit into the pivot 17c which stood erect for the stopper 17 further from the stopper's 17 nail 17a at the tip side, enabling free rotation, and the input code 9 is pulled out from the code cash-drawer hole 20a of the housing 20, contacting this roller 17d. Thus, when the roller 17d engages with the input code 9, the ratchet release means of which operation of the ratchet means which is relation by the side of [15b / 15c] the gentle slope of the infeed 15a of the nail 17a and the flange 15 and a steep incline is canceled is constituted. If the pivot 17c is little fricative construction material and shape, the roller 17d is also omissible.

[0030]In the above composition, the operation is explained below. When elongating in order to connect with the audio equipment which does not illustrate the input code 9, it pulls in the direction of arrow B with the input code 9. Then, since the reel 11 is energized in the direction which does not make the input code 9 pull out according to the stability of the coil spring which is not illustrated, By the synthesized vector of energizing force and the hauling power to a code, on the roller 17d. Therefore, the rotational force of arrow R6 direction arises for the stopper 17, as the dashed line showed, put, and separate from 17a from the infeed 15a for the lock of the flange 15, and the balance state of this power has been maintained. That is, it lets out the input code 9 like drawing 4 (b) from the reel 11 rotated in the arrow R8 direction, with the nail 17a separated. And if hauling of the code 9 is stopped in arbitrary parts, the press to the roller 17d will be lost and the stopper 17 will rotate in the arrow R7 direction with the energization spring 18, In this state, according to the stability of a coil spring, it rotates in the arrow R4 direction, and the nail 17a eats into the steep incline side 15c of the infeed 15a for a lock, and stops the reel 11.

[0031]Thus, since the nail 17a is cut deeply and shifts from 15a by contacting the roller 17d when pulling out the input code 9, the stopper's 17 nail 17a and the infeed 15a of the flange 15 do not fit in mutually, and do not generate a click in the drawer of the input code 9.

[0032]If the stopper's 17 release button 17b is pressed when storing the input code 9, the nail 17a is wide opened from the steep incline side 15c of the infeed 15a of the flange 15, according to the stability of a coil spring, it will rotate in the arrow R4 direction and the reel 11 will roll round the input code 9.

[0033]Thus, since the thing which made the roller 17d fit into the pivot 17c which stood erect for the stopper 17 at the extended tip of the stopper's 17 nail 17a, enabling free rotation was provided and it was considered as the ratchet release means in this embodiment, The stopper's 17 nail 17a is pressed in the flange 15 direction with the energization spring 18 at the time of extension of the input code 9, and the state where fell to the infeed 15a and the **** lock is carried out is made to cancel, While pulling out the input code 9 then, it puts and 17a does not fall in the infeed 15a of the flange 15, and a click is not made like before between

them.

[0034](Embodiment 3) The important section explanatory view of the headphone with a code take-up motion of the embodiment of the invention 3 and drawing 6 are the same, and drawing 5 is an explanatory view of the code storage propriety operation. This embodiment explains only a different portion on the basis of the composition of Embodiment 1. In drawing 5 (a), the locking member 27 and the release member 28 are supported pivotally by the axis 6, enabling free rotation, and the nail 27a of the locking member 27 carries out press insertion at the infied 5a of the flange 5. The shock absorbing material 27b of the construction material of elastic rubber, a synthetic resin, etc. has adhered to the root of the nail 27a like drawing 1 and 2. It puts to the axis 6 of the locking member 27, the engagement part 27c is formed in the opposite hand of 27a, a part of release member 28 28a contacts this engagement part 27c, and the energization spring 29 is ****(ed) between the engagement part 27c and the release member 28. It is energized in the arrow R9 direction with the energization spring 8 which applied one end to the locking member 27, and applied the other end to the substrate or the housing like drawing 1. And the release button 28b provided in the end of the release member 28 engaged by the locking member 27 and the engagement part 27c carries out the same operation as the release button 7b in drawing 1. And the inhibition member 21 rotates in the arrow R10 or the R11 direction focusing on the axis 22, and a checking means is constituted by not intervening in the blocking part 28c of the release member 28 according to rotation so that drawing 6 may explain.

[0035]The headphone 30 for one ear to which the code take-up motion included composition like drawing 5 was attached in drawing 6, Although the headphone 31 to which a code take-up motion is not attached do not illustrate with the head strap 32, they are connected with the headphone 31 for the ears of another side by the electrically connected input code, and the headphone of a truncated form are constituted. As for the head strap 32, the bent parts 32a, 32b, and 32c are formed, and the arm parts 32d and 32e of the head strap 32 are bent in this portion in an inner direction. The arm parts 32d and 32e of the head strap 32 are connected by the rotating shafts 32f and 32g to the headphone 30 and 31, enabling free rotation. And 32 f of axes are interlocked with the axis 22 of the inhibition member 21 mentioned above.

[0036]Here, the inhibition member 21 is formed in the shape of a cam, and has the notch 21a so that more clearly than drawing 6 (b) and (d). And although the blocking part 28c of the release button 28b makes the thrust of the release button 28b concerned prevent in the state ((b) figure) corresponding to the inhibition member 21, the blocking part 28c will be in the state which can be pressed about the release button 28b in the state ((d) figure) corresponding to the notch 21a. When actually equipping a head from the state of drawing 6 (a) for listening, as the headphone 30 and 31 are extended and it is shown in the (b) figure, the arm part 32d will rotate in the arrow R12 direction focusing on 32 f of axes, but. Even if the arm part 32d

concerned rotates to the position shown with an imaginary line, the inhibition member 21 serves as shape which fully has a correspondence relation at the blocking part 28c.

[0037]Operation is explained below. Headphone like drawing 6 (a) in a usable state and the condition of use which extended the headphone 30 and 31 further. The inhibition member 21 is in the bottom of the lower part 28c of the release button 28b, i.e., a blocking part, like drawing 6 (b), Since it is prevented by the inhibition member 21, 28b does not move and the nail 27a is not wide opened from the steep incline side 5c of the infeed 5a of the flange 5 even if it presses the release button 28b, the reel 1 cannot roll round the input code 9.

[0038]When headphone are folded up like drawing 6 (c) next, the cam part of the inhibition member 21 corresponds to the notch 21a like drawing 6 (d), the lower part 28c, i.e., the blocking part, of the release button 28b, The release button 28b can be pressed, the nail 27a is wide opened from the steep incline side 5c of the infeed 5a of the flange 5, and the reel 1 rolls round the input code 9.

[0039]When trying to pull out the input code 9 in the (a) figure of the usable state of headphone, the motion of the release button 28b is prevented by the inhibition member 21, but, The locking member 27 can resist the energization spring 29 like drawing 5 (b), and it can rotate in the arrow R13 direction, and can separate from the release member 28, and the nail 27a is canceled of the steep incline side 5c of the infeed 5a of the flange 5, and can pull out the input code 9 like Embodiment 1. Drawing 5 (c) and (d) shows the independent shape of the locking member 27 and the release member 28, respectively.

[0040]In this embodiment, thus, a foldable head strap, The inhibition member interlocked with the rotation to headphone is provided, The vigor complementary can prevent a risk of a code, a plug, etc. being equivalent to the face by having prevented storage of the code in the state where the head was equipped at the time of code storage by preventing storage of input code by the usable state and condition of use of headphone by this inhibition member.

[0041]It is effective even if combining the composition of Embodiment 3 with the composition of Embodiment 2 also combines with the conventional headphone with a code take-up motion possible.

[0042](Embodiment 4) Drawing 7 is a rear elevation in the state where the head strap was folded up, in the headphone with a code take-up motion of Embodiment 4. 40 and 41 are headphone, like Embodiment 3, the head strap 42 comprises the figure so that folding is possible, and the arm parts 42a and 42b are connected with the headphone 40 and 41 by each shank 43, enabling free rotation. The release button 44 as a release means of which the same cord winding device as the embodiment mentioned above is stored by one headphone 40, the code 9 has come be pulled out and made to them, and inhibition of input code rolling up by a rolling-up means is canceled is formed.

[0043]Here, the release button 44 is arranged corresponding to the position to which the arm

part 42a of the head strap 42 corresponds where a head is equipped with headphone for listening. Namely, it is extended in the case of use, the arm part 42a rotates in the arrow R14 direction, and will be in the state which shows with an imaginary line from the folded state shown in drawing 7 by a mounting state to a head, the release button 44 will be covered by the arm part 42a concerned, and the release button 44 will be in the state which cannot be operated.

[0044] Thus, according to the Embodiment 4, in the state where it equipped for listening, the final controlling element of a release means itself cannot be operated, and it becomes by the arm part of a head strap, without it seeming that it is going to operate it by mistake.

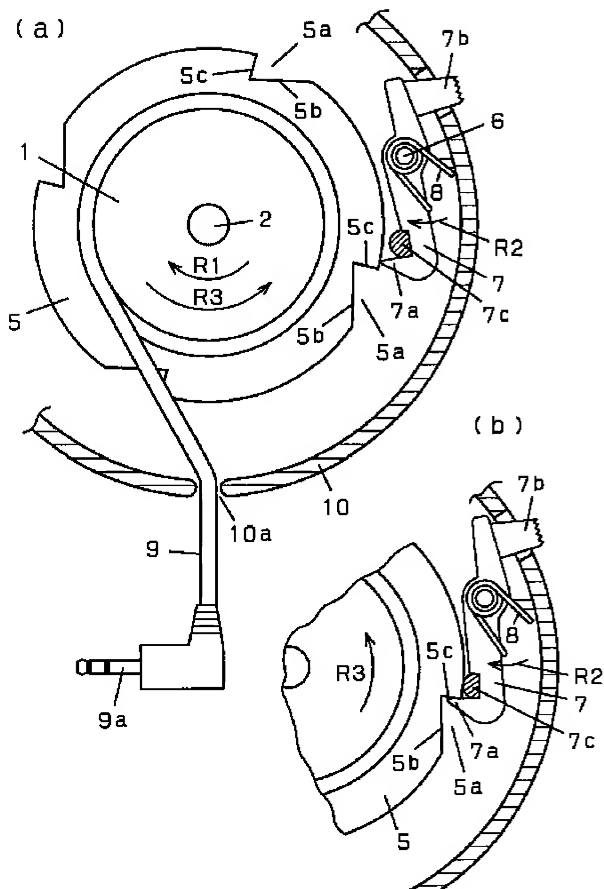
[0045]

[Effect of the Invention] As explained above, the advantageous effect that the headphone with a code take-up motion of this invention can reduce the click generated when the composition of claim 1 draws out input code and both the members of a ratchet means contact intermittently by a buffering means is acquired.

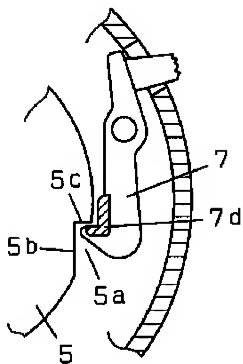
[0046] The advantageous effect that both the members of a ratchet means can be prevented from generating a click intermittently in contact with the time of operating a ratchet release means when pulling out input code, and pulling out input code by composition of claim 2 is acquired.

[0047] When headphone can equip a head and have furthermore become a mounting state by composition of claims 3-5, it prevents from rolling round input code in a housing by a checking means, Vigor ***** input code or a plug can be prevented from doing harm to a human body by rolling up under wearing.

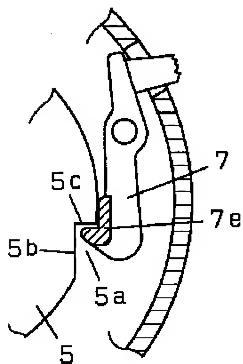
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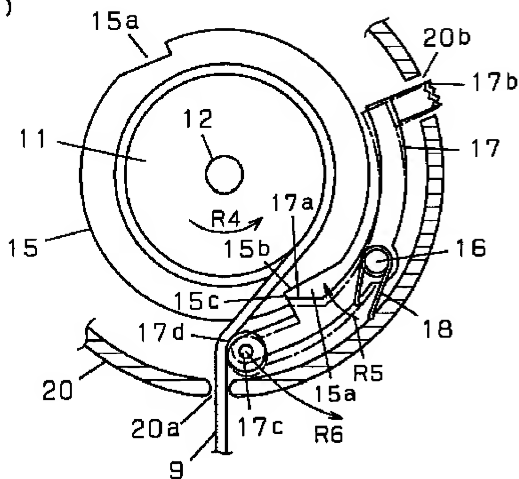
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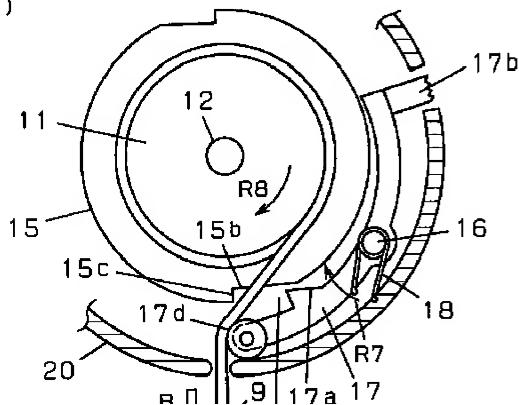
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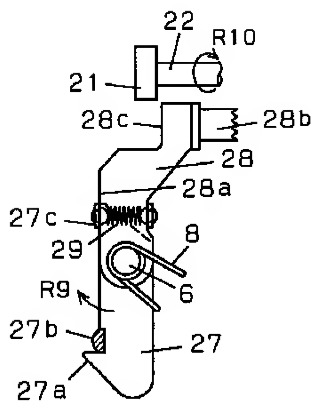
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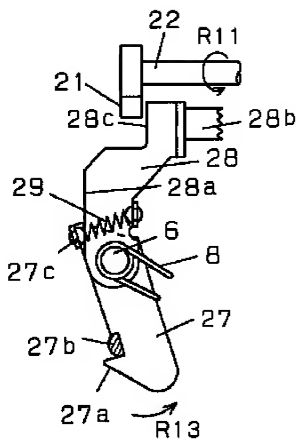
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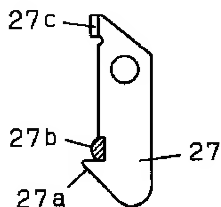
(a)



(b)



(c)



(d)

